MEMORIES, REFLECTIONS AND RETROSPECTIVE, BY WILLIAM (BILL) POPE, W6TKE—

GEARS 75th Anniversary August 2014

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MEMORIES - REFLECTIONS AND RETROSPECTIVE

MY INTRODUCTION TO HAM RADIO & GEARS

BY WILLIAM POPE, W6TKE (SILENT KEY)
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TRANSCRIBED BY CAROL POPE BROWN

When I was in the sixth or seventh grade, I lived in Hamilton City at that time...it was in the 5th grade I guess, and at that time, I got interested in various things, including for some reason or other, telephones. A friend of mine down the block and I used to stretch out string between our two houses. We would tie the string to a button and put it inside a can. The string went through the hole in the can, and holding the string tight, you could talk into one can. Your voice vibrated through the string and would come out in the other can. From that point on, we were hooked, because we could talk over a distance. So immediately, you say, "How can I do it better?" We found out by rosining the string with rosin for a violin string, and rubbing it over the whole string, the vibrations would be transmitted much better. It was louder, it worked better. It acted more like wire.

Then eventually we did try wire...wire we had borrowed from an old motor at the Holly Sugar Company. We would pull this wire and stretch the wire out. The wire vibrated pretty good. Then we learned to do it electrically. Mill's Orchard, which used to be a common name in this area, had a big food grocer in Hamilton City, and they supplied fruit for grocery stores all over California. They had phones that hung on the wall and had cranks on them. Then they put in new models, because you could crank those old things and give yourself one whale of a shock. We were interested in using the old ones that had the cranks so they gave them to us.

The receivers from the headphones…we found out if you connected the wires from one receiver to the other one directly, you could scratch on the diaphragm of one receiver, and you'd hear it in the other one.

We didn't know just why at that time, but later on we learned that the earphone consisted of a magnetic disc and a coil of wire, and it worked by electrical current going through the coil of wire—varying current—and causing a varying magnetic field on that disc and it would vibrate. That's what would make your sound. So we learned how earphones worked, and then we got the idea that, "Gee, how did the electricity get in there in the first place?" And then we learned about carbon microphones, and that in an electrical phone, current from a battery goes through a microphone that has a diaphragm and a little sack of carbon in it, and electricity goes through the carbon, and then through the wires into the receiver at the other end. When that carbon vibrated, it changed its resistance to the electrical flow of energy. So as it vibrated with sound, the resistance varied the energy and the electricity in the other earphone end varied the amount of magnetism on the diaphragm.

So we learned, as kids playing with this stuff, how carbon microphones worked, and how earphones worked, and the fact that you didn't need the carbon mike. You could use an earphone as a microphone, because it generates electricity—not as strong, but we could hear each other just by talking in the earphones. So we hooked the earphones at each end of their wire, but we found that we needed two wires so we strung out two wires and that worked fine. We could hear each other pretty well.

Then we began learning more about electrical telegraphs, and telegraphs and they didn't require two wires. They were using telegraphs with one wire, going through the apparatus to a ground at each end. The ground was the return path, and early telegraphs used that system. So we said, "Why not?" We put big ground stakes, iron ground stakes at each end, and hooked our earphones to the ground stakes, to see if we could do the same thing through the ground with the earphones that you can do with the microphones. It worked, and we didn't need two wires, and we got to thinking, "Gee, with the extra wire we got, we could branch out and have a party line with more people on it."

And so…we had wires strung over six different houses in Hamilton City.

We were at the point of trying to figure out how we could get across (the railroad tracks)—we had two people who lived on the other side of the tracks, and they would have liked to be in on the communication but we never did figure a way to get across the tracks. We figured we should be able to use the tracks. We could hook on the tracks as conductors up at one location and further down hook on to them again, and pick the signal off but that never did work. They were shorted out in between by?...we never did find out for sure.

I was in the eighth grade by the time we got to that point. By that time I had discovered something else, because when I was in the seventh grade, my folks gave me a Stewart Warner radio, a table model radio. You could get AM radio on, and you could also get the soap operas that kids used to listen to at that time. Little Orphan Annie, and all the things at that time. I found out that by tuning the radio clear up past KFI, up at the 1600KHz portion of the band, there was some communicating going on that wasn't soap operas. It wasn't radio, it wasn't music, it was guys talking to each other. I listened, and learned that there was something called amateur radio, and they were using the wavelengths on the upper end of the broadcast band.

On three of the signals I heard all the time, they were talking to each other. One was a fellow named Nola Dixon, W6RHC, which were his call letters; another was W6DPL, his name was Burr Heywood; another was W6GUV, and his name was Winston Roberts. Those three people on the end of the broadcast band, I learned later, were on something called the 160 meter amateur band. Well that amateur band was so close to the broadcast band that many—not all, but many—broadcast radio would pick it up. Even if they wouldn't, I learned later which little capacitor to turn, in a lot of these radios, in order to tune it to that part of the band.

By the time we got a little further along, I could put any broadcast radio on a 160 meter amateur band. Sometimes it fouled up the calibration of the other stations a little bit, but at that time you could get old radios because newer radios were being built, and the old radios were around, so you could get old radios and make Ham receivers of them.

GEARS...as I recall:

GEARS is an amateur radio organization, and from the very beginning, amateur radio was set up and authorized by the Federal Communications Commission as a definite purpose, and that was to help provide an opportunity for new people to get into a technical field and do things with it of an educational nature. The FCC was charged with licensing all forms of radio transmission at that time. No one could transmit a radio wave without an authorization and a license to do so. Otherwise, if they hadn't have had something like that, there could have been chaos on the airwaves, and they never would have had any useful applications for radio.

The FCC helped radio provide a useful and a directed purpose for communities, countries, military, and everyone else. One of the objectives of the local amateur radio organizations was to recruit new members, and from people who wanted to learn about this field of technical communication called radio. The idea was to make it possible for youngsters, young people, to get into the field. You couldn't go to school and learn about Ham radio.

So, one of the purposes of amateur radio, and the purpose of this group formed locally, was to provide an opportunity for new amateurs to get acquainted with what radio is all about, what can be done with it for the community, and for the individuals. So the local club made an effort through some of its members to get acquainted with youngsters, meaning high school educated at that time, who might be interested in learning about radio.

The GEARS Club, which is the Golden Empire Amateur Radio Society, is the overall club. Meetings were held monthly. There was only one club and the meeting place was in Gridley, once monthly..third Friday of the month as I remember. W6BDW was the amateur whose call letters we used to form the club. And then we switched to W6RHC in honor of Nola Dixon, who was a charter member of the club, one of the first hams in this area, and those were his call letters too. (Maybe we took his call sign after Nola died. Anyway, that is going back about 75 years.) Up until they did that GEARS was just the one club.

As I said, GEARS started out with about nine members, as I remember, and I don't ever remember it going down. I remember it being added to every once in a while but it got be where a good part of our membership came to meetings every month from Gridley, Corning, Orland, Oroville, and Roseville or Marys-

ville. I think the early dues were something like 5 dollars…5 dollars would've been an awful lot at that time for us kids.

For amateur radio, this was a field of radio in which you didn't require commercial licenses, but you did require licenses obtained through the FCC, which was based on your demonstrating that you have enough information and knowledge to make use of the radio technology in a useful way without fouling things that other people were using it for. In other words, you had to learn a bunch of rules and regulations. And you had to learn some technology about radio.

One of the jobs of the local amateur radio group was to find youngsters who might be interested in getting into the field. That would be people who knew something about science, but not enough to get a license to have their own radio stations. The way they started in this case was to work through craft magazines and things like Radio-Craft. There were a number of magazines available including one produced by the National Ham Radio Organization, the Amateur Radio Relay League, which is still in operation. They published a Magazine called QST, and it was devoted to helping non-commercial use of radio become available to non-commercial users. It provided information about licensing, how you became a licensed radio operator, how you could build and operate your own radio station and communicate with other people who are doing the same thing. And that became quite an interesting thing for kids at that age.

At that time it was very seldom that anyone bought any ready-made equipment. Receivers were an exception; you could buy short-wave receivers, but most hams built their own receivers and transmitters. I've still got some of the very first transmitters I built and one of the receivers that I used for a long time. It was very fashionable to build your own transmitters up until about the early 40's because only about then could you buy "readymade" transmitters for less than $100 dollars or so; but it was more fun to build your own anyway. We went on the air with 1-and 2-tube transmitters that we built with radio tubes harvested from old radios; and we could run as much as 50 watts with the tubes and things available at that time. 50 watts would take you a long way on wireless code.

The early hams usually went on the air with code anyway because of the cost of voice transmitters. You could build your own voice transmitters but you were into a cost there in the $50 range or so. Mostly, ham radio was a do-it-yourself type of thing.

After the war ended GEARS concentrated on public service activities, like bike rides and events that were done to raise money for community service groups. We helped raise money to fund many organizations, and we worked at providing communications for message handling purposes.

GEARS has always been active on Field Day. Ham clubs throughout the country have been active on Field Day. They show up with the ham gear and they put up as many stations on the various ham bands as possible, not just 2 meters, and not just repeaters. They go on the other ham bands that require antennas for the longer wavelength, and on those other bands they communicate with other ham groups at other Field Day sites. Also at Field Day, they exchange messages from people who want to send messages to friends and relatives via radio.

Fox Hunts are an entirely different activity. It's an opportunity for hams to utilize their ability to operate, build, and function with transmitters and receivers in the UHF and VHF region. Because they are limited to line of sight, they are ideally suited for and activity called "fox hunting" in which you take a transmitter-the smallest I ever made were about an inch thick—just big enough to hold a couple of pen cells to power them. So, we would go on a Field Day site, exercise our ability to put up ham emergency equipment and get it into operation. Part of the operation included putting out these transmitters, which became foxes. The individual members of the club could take their receivers and tune them to that one specific UHF frequency usually on 2 meters and limited to one frequency…and because 2 meters is line of sight, these transmitters were limited to simple little antennas which you could only pick up a short distance away. You'd lose line of sight when you went too far.

The idea was to find the fox and, in our case, we used to hide two of them. If you found the first one, you would find a message in a little box that told you the frequency that the second fox was hiding on. You had to find the first one to go to the right frequency to find the second one. You had to use directional antennas. That's the only way you would do it because you could hear the signal for maybe half a mile around there with a non directional antenna. If you are good at it and have good equipment you could find a fox in short order. If you found the fox first, there were prizes available. So…fox hunts had become quite popular at ham fests everywhere, and they even use them in the cities where the ham fests don't involve setting up emergency equipment in the wilderness.

***WHAT IS QST*?**

QST is a three letter group of one of a large number of codes which are used in communication to mean certain things. In the early days of radio, and in communication in general, before radio, they communicated by wire. And they did not have telephones. Before telephones, they communicated by electrical signals turned on and off in a wire, and the code they used to communicate with was made up of dots and dashes, long and short electrical sounds, which stood for letters. QST was the three letters which had the meaning, "calling all people interested in radio communications." QST. So, if you heard a station sending "QST" on the radio, it meant that they were looking for anyone interested in the communications, and there were many of these three letter groups that meant certain things. And they're around today; they do a lot of things.

CQ or QST?

If you call , traditionally that is, means you're open for a call from any ham anywhere you are. If you're calling CQ on a particular frequency, it's expected that the reply will come on that frequency. So, if I call CQ on 2 meters, I wouldn't listen on 10 meters because I know that in the first place, there's probably no one going to be transmitting on 10 meters in response to a signal they hear on 2 meters. If I get on 10 meters or 160 and I call CQ anyone can come back to me but I'll listen first on my frequency and that's who I'll probably hear. QST, on the other hand, is something similar but it's not limited to any particular frequency. It's a written form of CQ and it's simply "shorthand" for "calling all stations". So, you could say QST is a text abbreviation, where CQ is strictly a code abbreviation.

As an individual, I could go up to Forest Ranch…I could use the antenna tower, put an antenna on that would work on 40 meters connect a 40 meter transmitter and receiver to it, and by selecting my time of day and time of year to the right time, I could talk with Europe on 40 meters or I could talk with China; but it's not as if I'd be going through the ionosphere, so it's not as reliable. I know that there are certain times of day, year and so forth, that are better for the ionosphere than others; but as far as operating a transmitter to talk with those areas…other than the 2 meters…you wouldn't find it operated by GEARS.

Well, going back just as little bit to the very first means of communicating…the idea of talking from one place to another at a distance became popular, not long after it became popular to be able to move from one place to another at a distance with motors and foot pedaled vehicles and things of this sort. The

earlier way of communicating was set up by some early experimenters. A fellow named Samuel Morse and a fellow named Marconi contributed a great deal to electrically communicating, at that time, over wires because they didn't have radio. And so they could turn an electrical circuit on and off over a wire as long as they had some way of converting that information to numbers or letters, or something useful. This gave rise to the Morse code.

QST actually is three letters derived from the Morse code in which the Morse code had a group of dots and dashes, short and long sounds, for every letter in the alphabet. "A" is one short and one long sound—"dit-dah" is a way of vocalizing it. "B" is "dah-dit-dit-dit", and "C" "is dah-dit-dah-dit". "E" is the most commonly used letter in our English alphabet, and the symbol for "E" is simply a "dit". It's the shortest of them all. It takes up less space and less time to send, which is reasonable because there are a lot more of them. Letters that are less common were allotted longer symbols. "C" is a less common letter, its "dah-dit-dah-dit". "Z" is "dah-dah-dit-dit", four elements of it. The Morse code went through several different changes. There was the Continental Morse that they used for the first communication by electrical signals. You string a wire from here to here, hook a battery to it, and something to convert this electricity to a sound, called a sounder, and you have a telegraph set and that was the first communication over a distance.

Radio communication grew out of that, because when Marconi learned how to send an electrical signal through the air with no wires it was natural that he use this code to use the electrical signal to make letters so he could send messages. The code at that time was made up of clicks, because an electrical signal on a wire operating a sounder made a clicking noise. So, actually a "dah" was two click: "di-di"...a "dit" was one click: "di". So "A" was really "di...di-di". And the space between them was important.

It was a kind of difficult code to learn to use with the early telegraphers, and they used this for railroads and many things before they had radio. The early telegraphers had to use that kind of code for all of their work. When the Morse code came along and they used long and short sounds, it was because equipment that made radio waves could be turned on and off. It was convenient to make long and short sounds in a receiver from that radio signal. So the Morse code which was adapted for radio use, used the long and short sounds, whereas the Continental Morse was the clicks and was actually the first code they used.

Amateur radio started right out with long and short sounds, so we learned the "dits" and "dahs" instead of the "di's" and "di-di", with the space between them. Now...the thing is, to get even the simplest license, so that you could put together your own radio transmitter and transmit a signal to someone across town or around the world, you had to learn the Morse code, the radio Morse, and you had to demonstrate your ability to send and receive the "dits" and "dahs" at thirteen words per minute, thirteen five-letter words per minute. And you had to pass a code test -the FCC gave these tests—you had to pass a thirteen word per minute code test before you could even take the written examination, which covered the rules and regulations.

Getting a license was not a real easy thing at that time. The code test was given in San Francisco, Los Angeles and a few capital cities by the FCC. I had to go to San Francisco to take my test to get my ham license. By the time my wife, Muriel, got her ham license, which she did because she was a ham wife, and it was just a nice thing to do (very few of them did it, but some did, and she was one of them who did). She got to take her examination from one of the licensed amateurs here in this area, a charter member of the amateur radio club GEARS. It was a lot easier than it was when you had to go to San Francisco, but it was still thirteen words a minute code. Later they lowered that to five words per minute, and they changed the license classes to simpler classes with less privilege, and that change was because of change in technology.

The very first radio waves sent signals over very long distances, and the only radio waves they could make at that time were fairly long waves. A long radio wave could go half way around the world if the sun spots were operating exactly right, because your long wave signal bounced off the ionosphere and came back to earth somewhere else. So countries got together and worked up a licensing system, which they all agreed on, to license all operators of equipment capable of making radio waves. And that way it prevented the radio spectrum from just getting to be a confused mess of interference. It was probably one of the best governmental organization jobs ever created, because it did just that—it organized communications on a worldwide basis.

We're getting ahead of the GEARS story a bit, but out of this early organization grew the various licensing privileges required. FCC set up licenses for governmental communications; they set up licenses for stations to broadcast news and – later on when they learned how to do it—music. All these licenses required different kinds of privileges, abilities and equipment. To get a commercial license was much more involved than to get a Ham license, a radio license for amateur work.

One of the objectives of amateur radio became to help spread the advantages of amateur radio, in that it was an opportunity to learn a technology and have an immediate application for it. Even to this day, it is the only means of communications in which an individual can sit down and connect together as few components, hook it up to a power source—battery—hook it to a wire for an antenna and communicate with someone across the street, across the city, across the country, or halfway around the world, without the aid of any telephone, telegraph, satellite, any other company, no other commercial company involved. Just two individuals with what they put together by themselves, with their own hands, can communicate. And it's the only means of communication to this day where it still operates that way. I could scrape up enough components in the drawers in my workbench and give you instructions for hooking them together and you could take those and a few flashlight batteries and send a wire out and have a radio station.

Now, amateur radio is great, but even amateur radio for the most part makes use of cell phones. The GEARS club had the first cell phone operation in this area. There are not many GEARS members that will tell you that, because they don't realize it. But this is true. The first cell was called a repeater. Amateurs were limited pretty much to very high frequency and ultra high frequency wavelengths. That's limited pretty much to line of sight. So when many bands of line of sight became available to amateurs, the first thing the amateurs did was say, "How can we make better use of these?" Because that is always what ham radio has done. How can we make the most use of what we've got? Those parts in a drawer, or whatever. And to make the greatest use of these line of sight frequencies that the amateurs were given, they created what is called a repeater. They built a receiver and a transmitter, hooked them up together, put them on a mountain top. The receiver was line of sight to a lot of other ham transmitters, and the transmitter at the mountain site could be heard by all of the receiving locations, because it was line of sight. So that was a cell, and everyone who operated on that frequency could talk with each other and they could all hear each other.

So….it was one community cell, so to speak. Now a Ham Club can get together—(or it doesn't have to be a club, it can be individuals)—and you can have your own repeaters, or you can build several repeaters, and you could have your own cell system. And so, the Hams have never been passed up by technology, they were always on the leading edge of it, making use of it.

There were some things that were off limits for generally new reporting, or even discussion, during WWII. That's where the technology rise really began. After the war, frequencies' which were developed for things like RADAR (Radio Detection and Ranging), and point to point communications were made available to amateurs, but because they were pretty much line of sight type of propagation the Hams had to find ways to use them and that's what gave rise to the repeaters for the Hams which were the first cells.

At that time, when those frequencies were made available to the Hams, it was figured why should the Hams have to do code at thirteen words a minute? The question was raised by the amateurs, why require thirteen words a minute code to use frequencies' which were limited to line of sight operation? There are better ways of communicating now. We've got FM we can use on those frequencies'. FM isn't practical on the lower frequencies. FM is kind of a wideband audio. So…the question came up, why require the code test for those frequencies? The novice frequencies were introduced and all that was required to get a license for the novice frequencies was five words as minute. Now, why code at all? Well, if you have a transmitter sending out a signal, if your microphone breaks, or your key breaks, or any of the number of things could happen, as long as you can put a signal on the air you can turn it off. And if you can put it on then turn it off, you could send code. So, basic code is the simplest and most direct form of communication. So they said, "Okay, five words a minute is required for basic transmitting license for any frequency."

Now, they've eliminated the code requirement entirely. All you need to get a Ham license is to pass a test in the basic rules and regulations. It's very simple. You can get a novice license, which limits you to the two meter amateur band. The two meter band has advantages. A quarter wave antenna is only eighteen inches long, which means an efficient antenna can be made with a quarter wave, so about eighteen inches long is all you need for an antenna. That is an advantage of the two meter band. You can get a novice license and go on two meters. Most people now just get a novice license to start with; because that's all you need to work the amateur repeaters. And every amateur club, just about, has its own repeater. The one for GEARS is up at Forest Ranch. There was at one time an antenna on a tower, and the reason for the tower was simply to get it up above the immediate trees and things. Now the

antenna is mounted in one of the trees. The repeater there can receive the two meter band over areas from about Sacramento to Redding, easily, if there is a decent antenna at each end. A simple two meter transceiver, handheld or on a car with an antenna that long, can work from Red Bluff to Forest Ranch, or from Gridley to Forest Ranch, with no problem. So any amateur with just a novice license can work the repeaters. You get your call sign and you can work through the novice repeater, and you can talk to any other amateur operating through the same repeater. And that means any Ham within reach of the repeater that has a novice authorization can communicate with you. So a novice license is the simplest license you can get and have fully fledged amateur privileges.

The amateurs actually got on the air before World War II ended. All the Hams went off the air immediately when the war started, but as soon as the war ended in Japan, we were allowed back on the air on 2 meters here because 2 meters didn't cover that area. We started making use of those facilities as public service use, with local public service groups, and I don't know just when it started actually. It got beefed up quite a bit when we started using the repeaters for longer range communication. The Hams have always, while they were in operation, engaged in a community service of relaying messages non-commercially between people. We'd take a message, relay it to a Ham overseas, and he would give that message to the recipient overseas…no charge! That has always been a service of ham radio. So, after the war, the licensed repeaters started making use of that also. In fact, while I was still in the service, I was assigned to what was then Camp Beale. At that time I had a military transmitter- a 1000 watt transmitter- assigned to me. I was licensed, along with other similar ones at other air bases around the country by the Federal Communication Commission to communicate on 10 meters with other ham stations.

Right after the war, we had displaced hams all over the world at various bases. Everybody was trying to get as message home, so we had hundreds of hams planning to send messages home. This means, we had amateur radio going on 10 meters relaying messages before the war was actually ended in Japan

In an effort to make maximum use of all of our frequencies' after World War II, we inherited a bunch of UHF/VHF frequencies that weren't much used by hams prior to that because they were limited to line of sight. Now of course, we have satellites and other methodologies available. Once those frequencies were available, hams started to look for more ways of using them. So that is when the local clubs began putting in repeaters and could make use of elevated sites. In fact, before there was a repeater in this area.

We had a place called Round Mountain, West of Corning, as our radio site. It was a commercial broadcast site, but what we had up there was a repeater site made and licensed for commercial use.

It was the type they put in first of all so that a community could run an FM station and pick up that line of sight signal, because you could usually only go to the horizon on FM. Those were in the hundreds of megahertz and in order to use those frequencies, UHF and VHF channels, which weren't usable for much of anything they were set aside; and a bunch of them were set aside for hams. That's when the local radio clubs said, "Hey, a natural, we got a mountain top over here. We'll put a transmitter and receiver there if we can have it licensed as a repeater." So, FCC licensed amateur repeaters for that purpose and consequently we could use a lot of these VHF and UHF channels that otherwise were going to waste.

In the effort to make better use of all these frequencies immediately, the idea came to certain public service and commercial groups, (such as fire, police, taxi) to use their own VHF channels for emergency or other communication of various kinds. When the hams got all of those inherited VHF channels they wanted to find a place to make use of them. The ways were to put in their own repeaters, and make use of the capabilities of VHF and UHF to a relay. Thus that allowed the hams to become active with the local first responders.

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